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UNITED STATES OF AMERICA.

MECHANICAL GRAPHICS.

MECHANICAL GRAPHICS.

AN EDUCATIONAL COURSE ON

THE THEORY AND PRACTICE OF MECHANICAL DRAWING.

BY

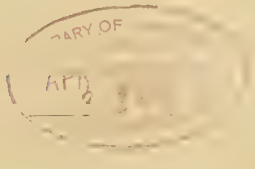
FREDERICK NEWTON WILLSON, C. E.,

Professor of Descriptive Geometry, Stereotomy and Technical Drawing

in the

John C. Green School of Science, Princeton, N. J.

15
1 1 28



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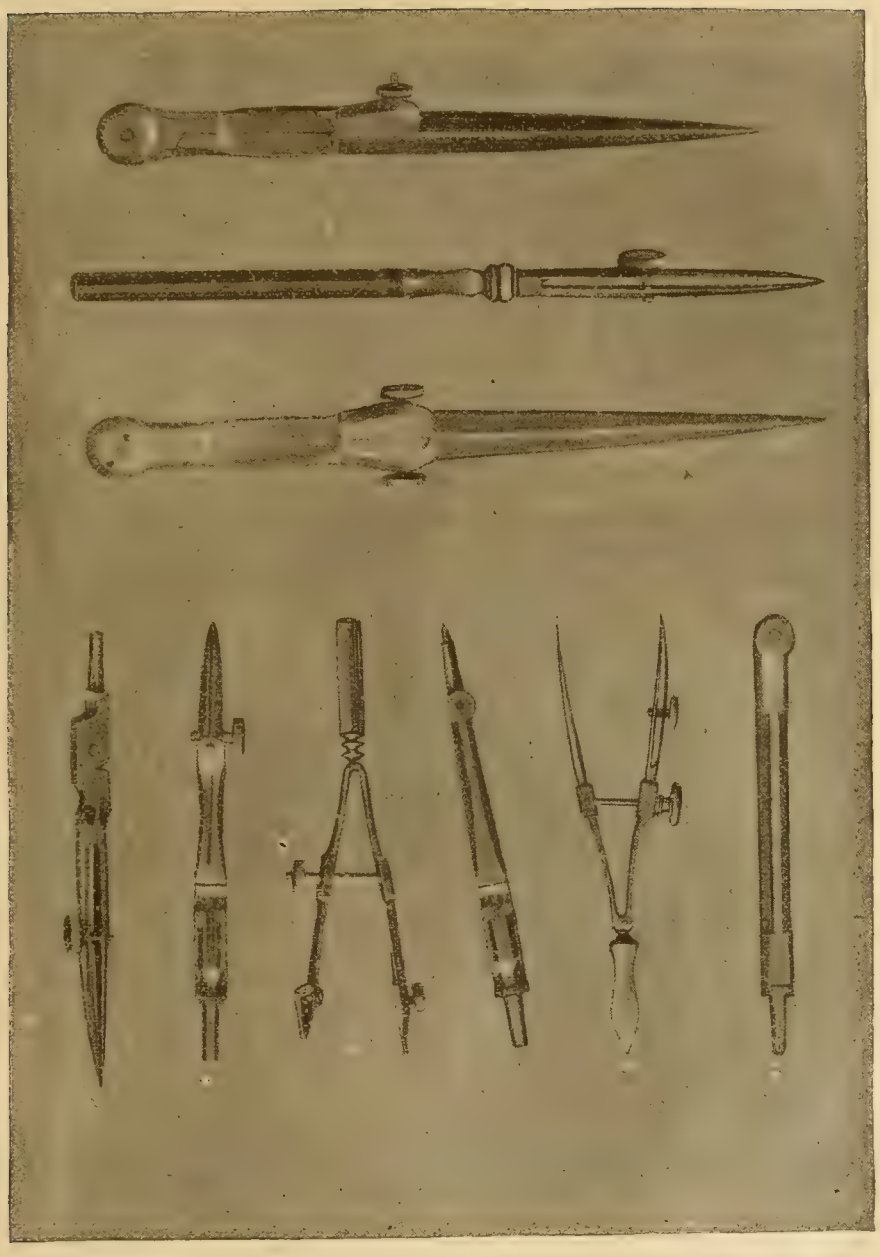

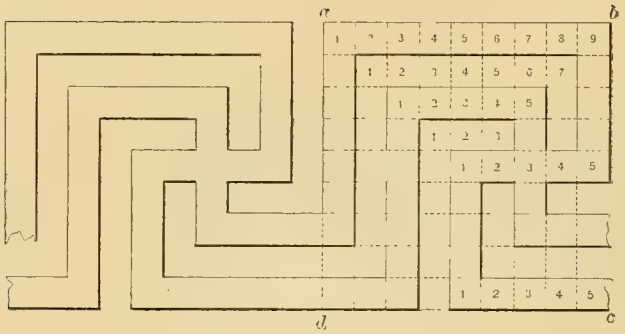
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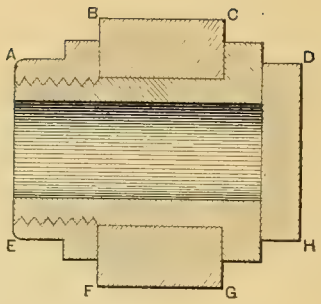
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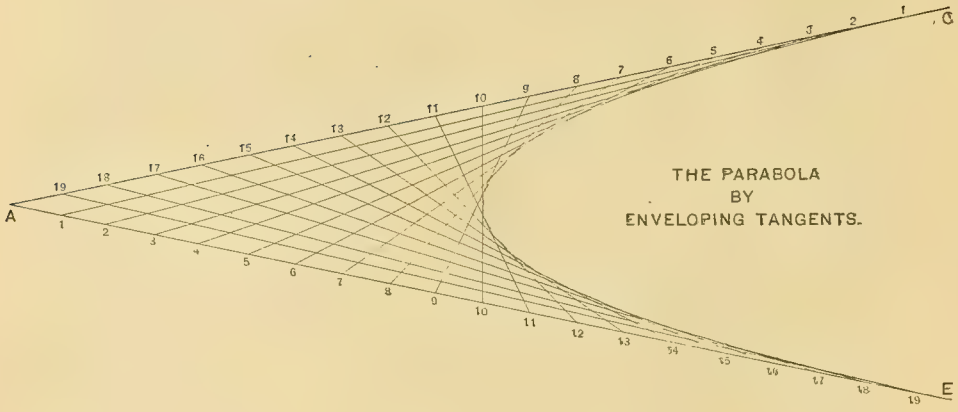
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THE PARABOLA
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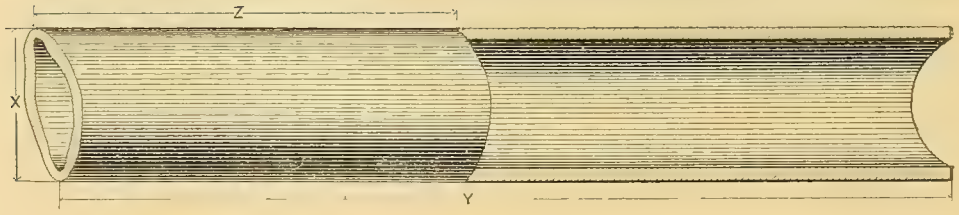
ENVELOPING TANGENTS.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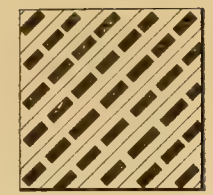
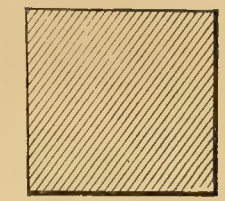


Cast Iron.

Steel.



Wr't Iron.

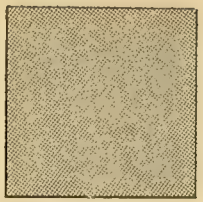
Brass.

Penn. R. R.

Standard Sections.

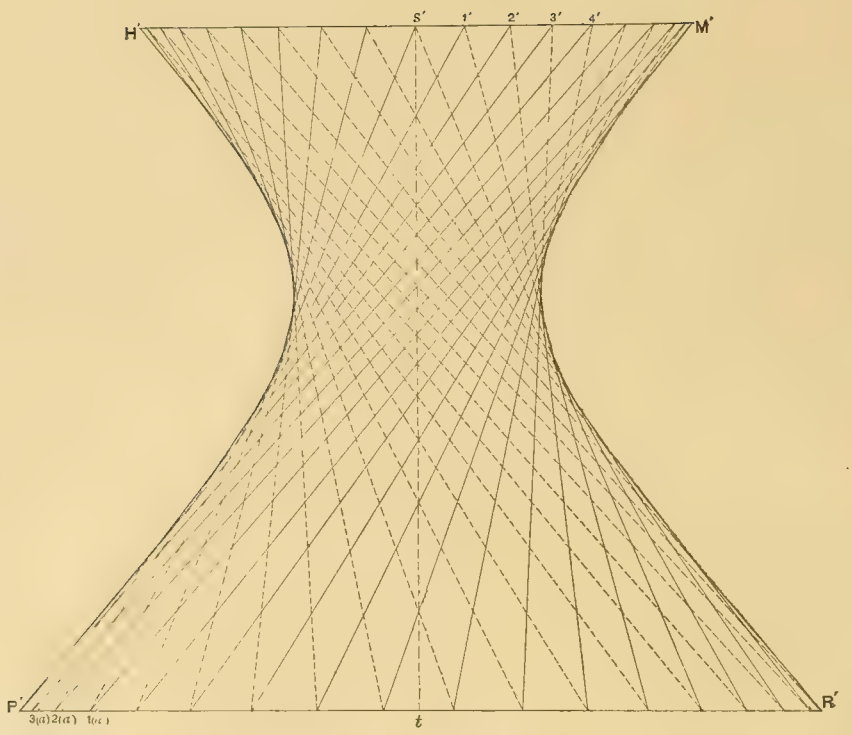
Stone.

Wood.



Copper.

Brick.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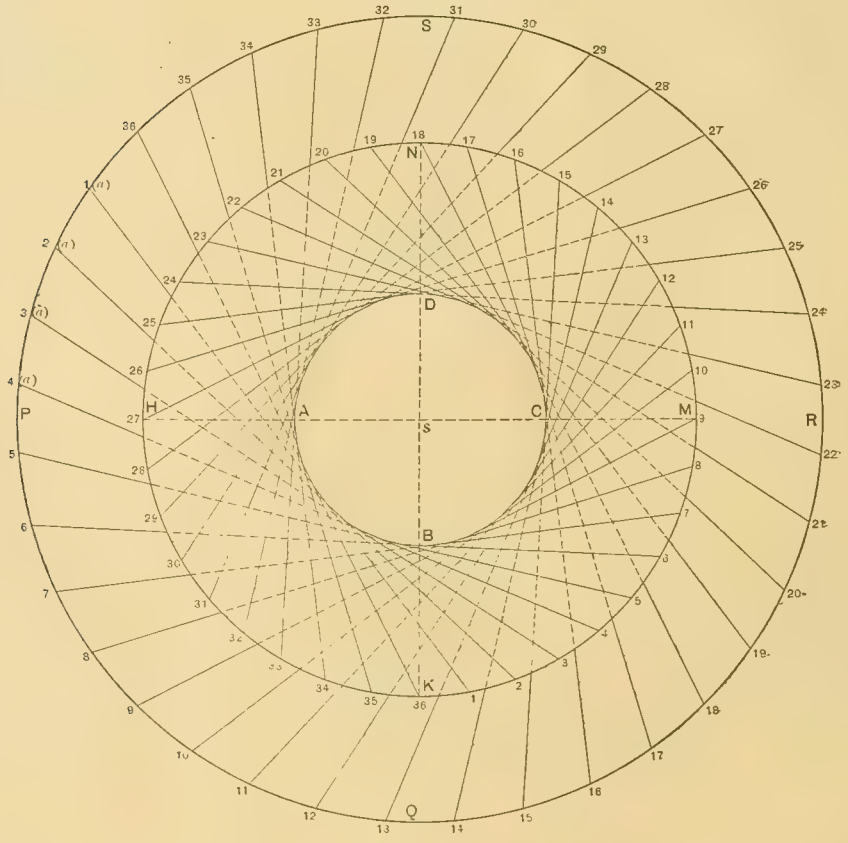
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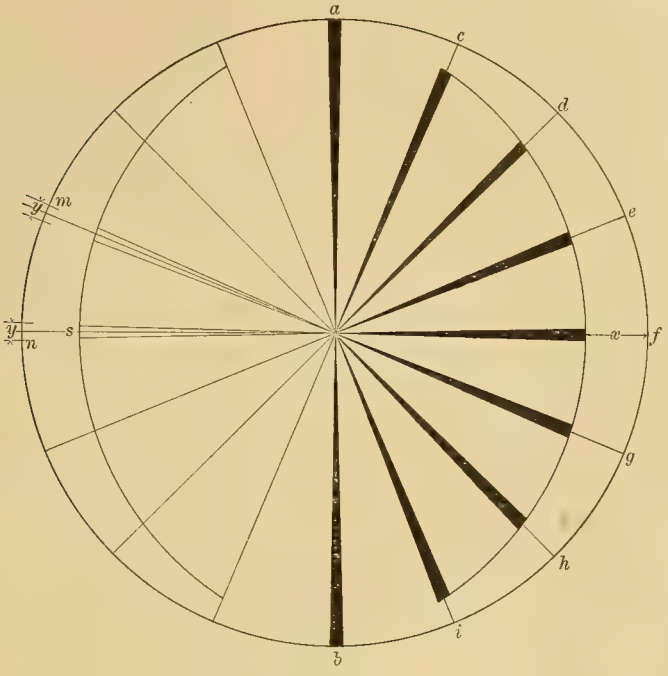
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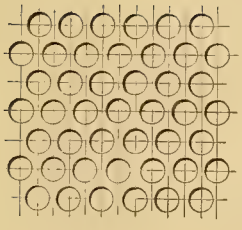

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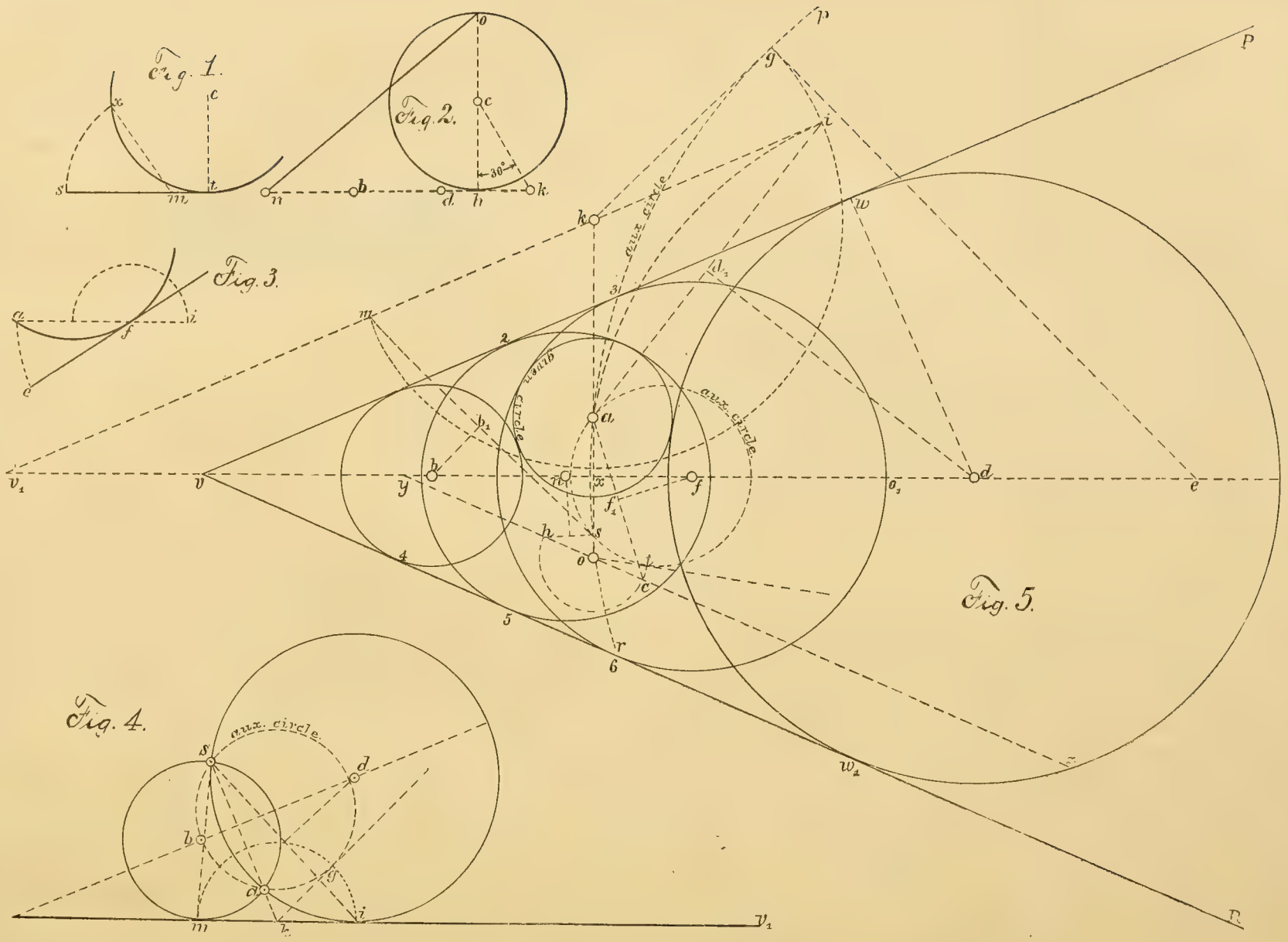
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Fig. 2.
Fig. 3.
Fig. 4.
Fig. 5.
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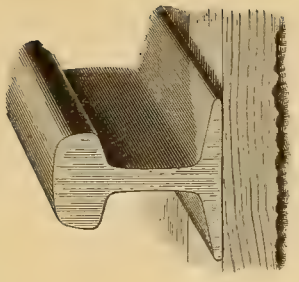
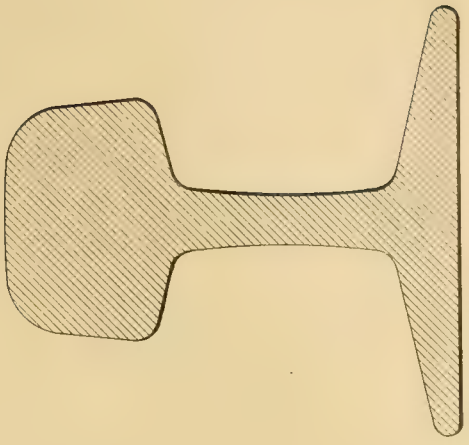
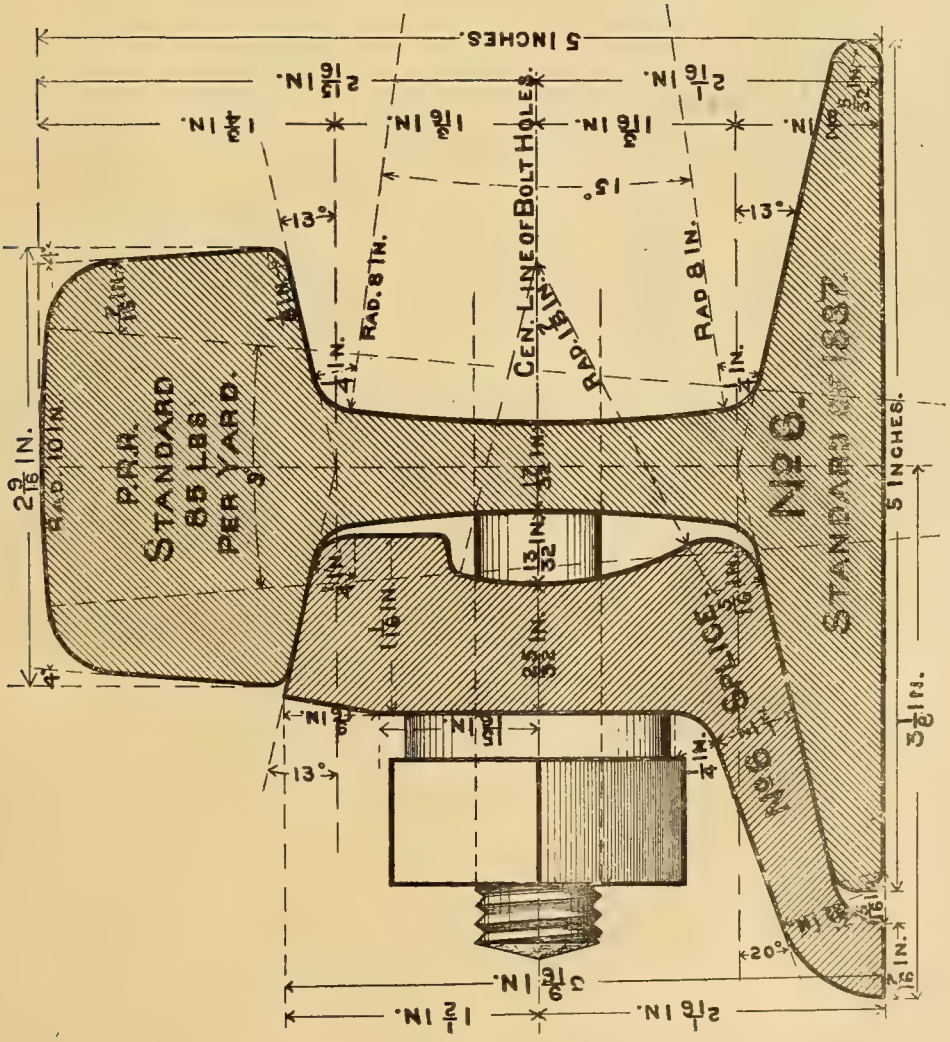
aux. circle
aux. circle
aux. circle
30°



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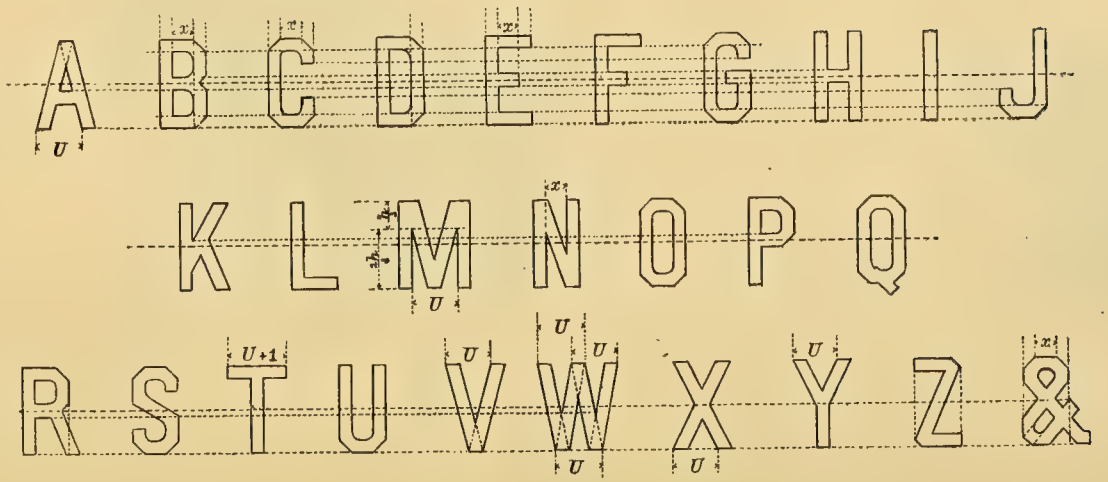

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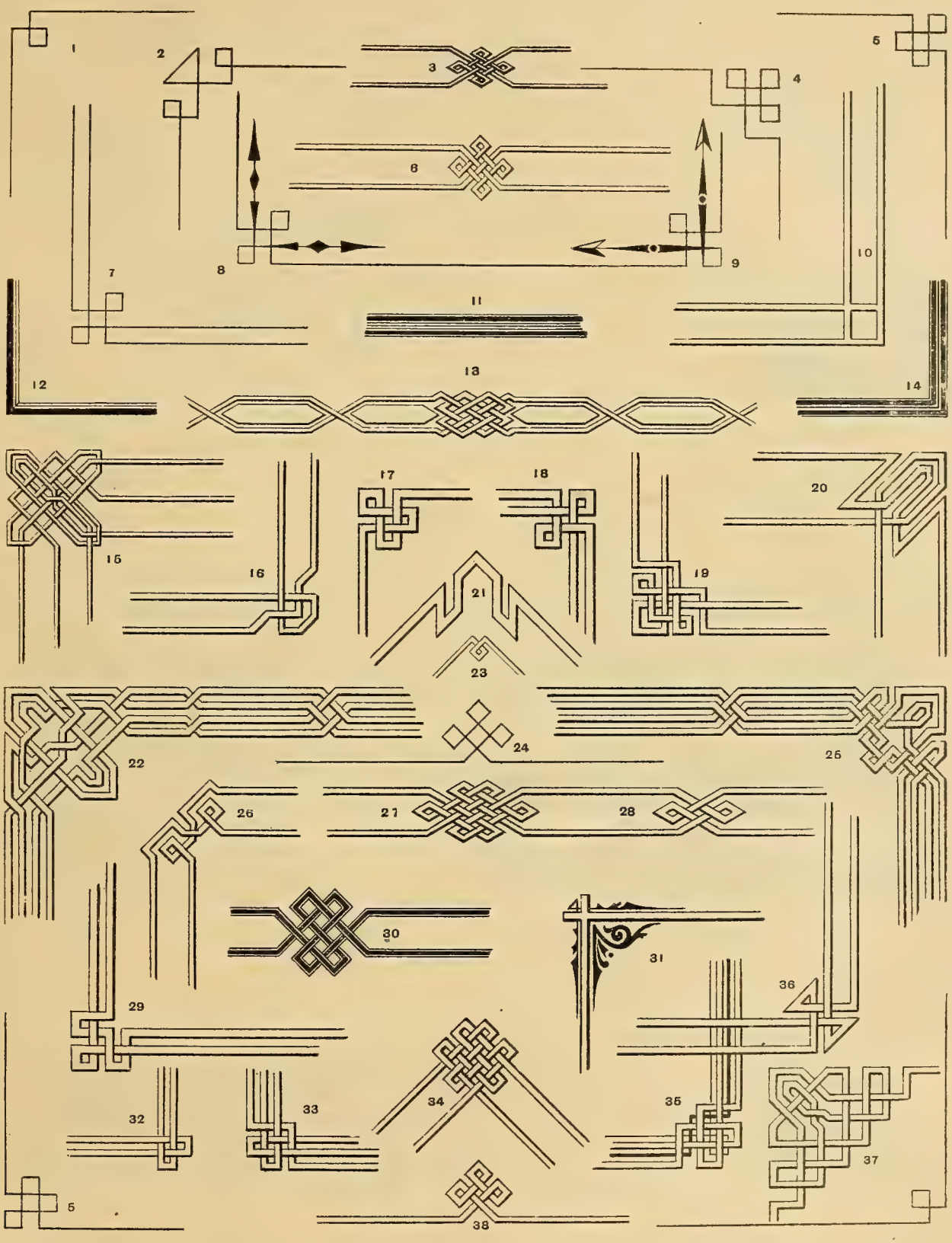
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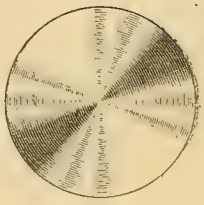
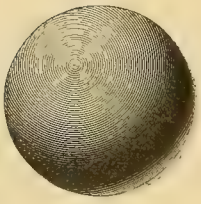
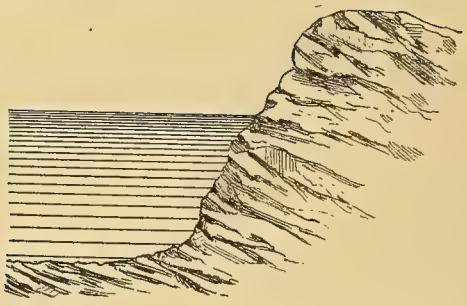
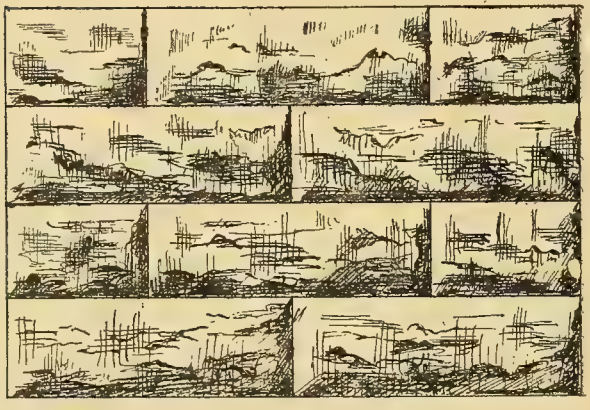
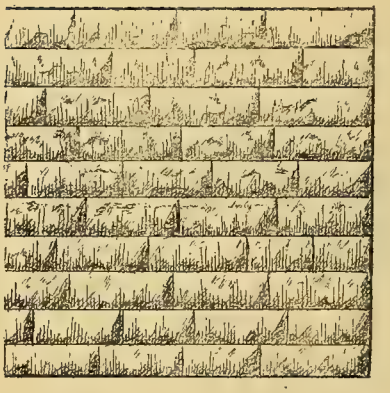
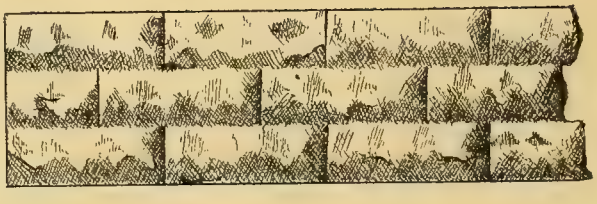


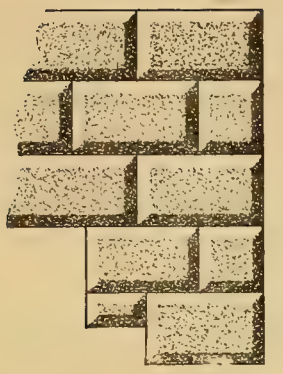


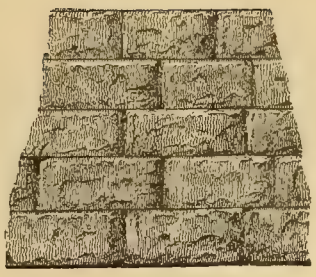


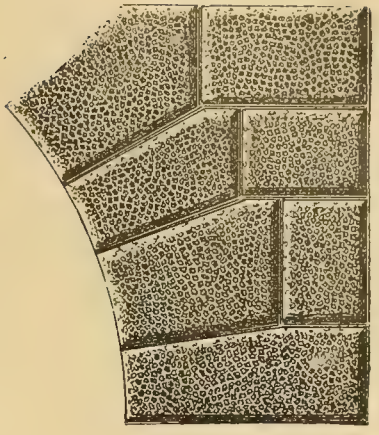


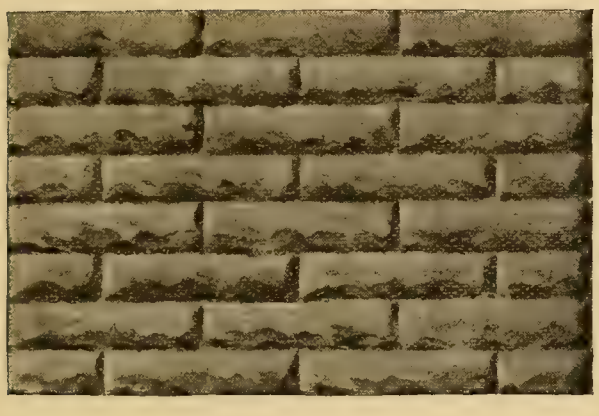


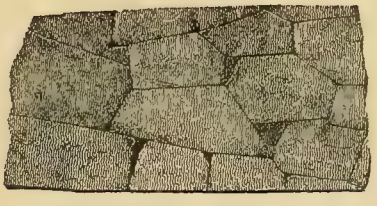


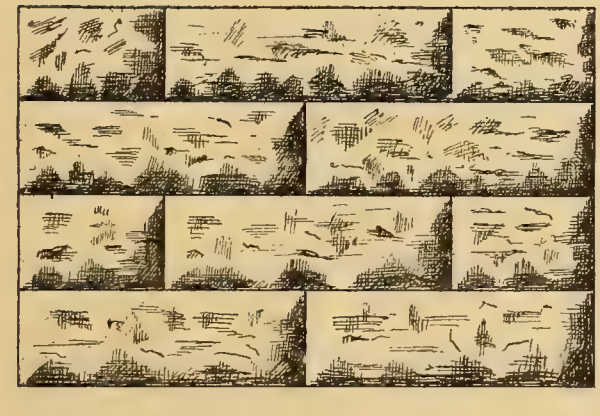


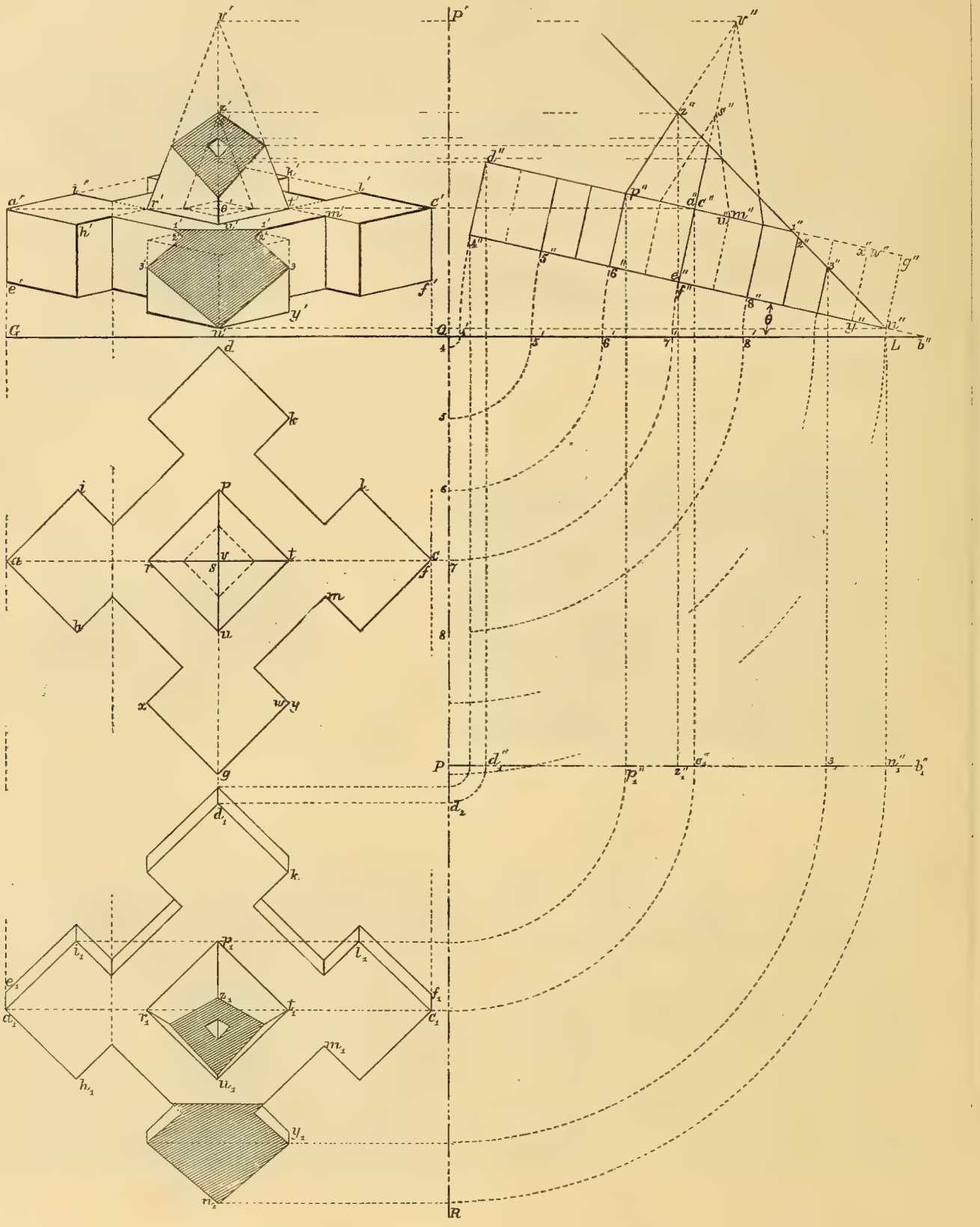


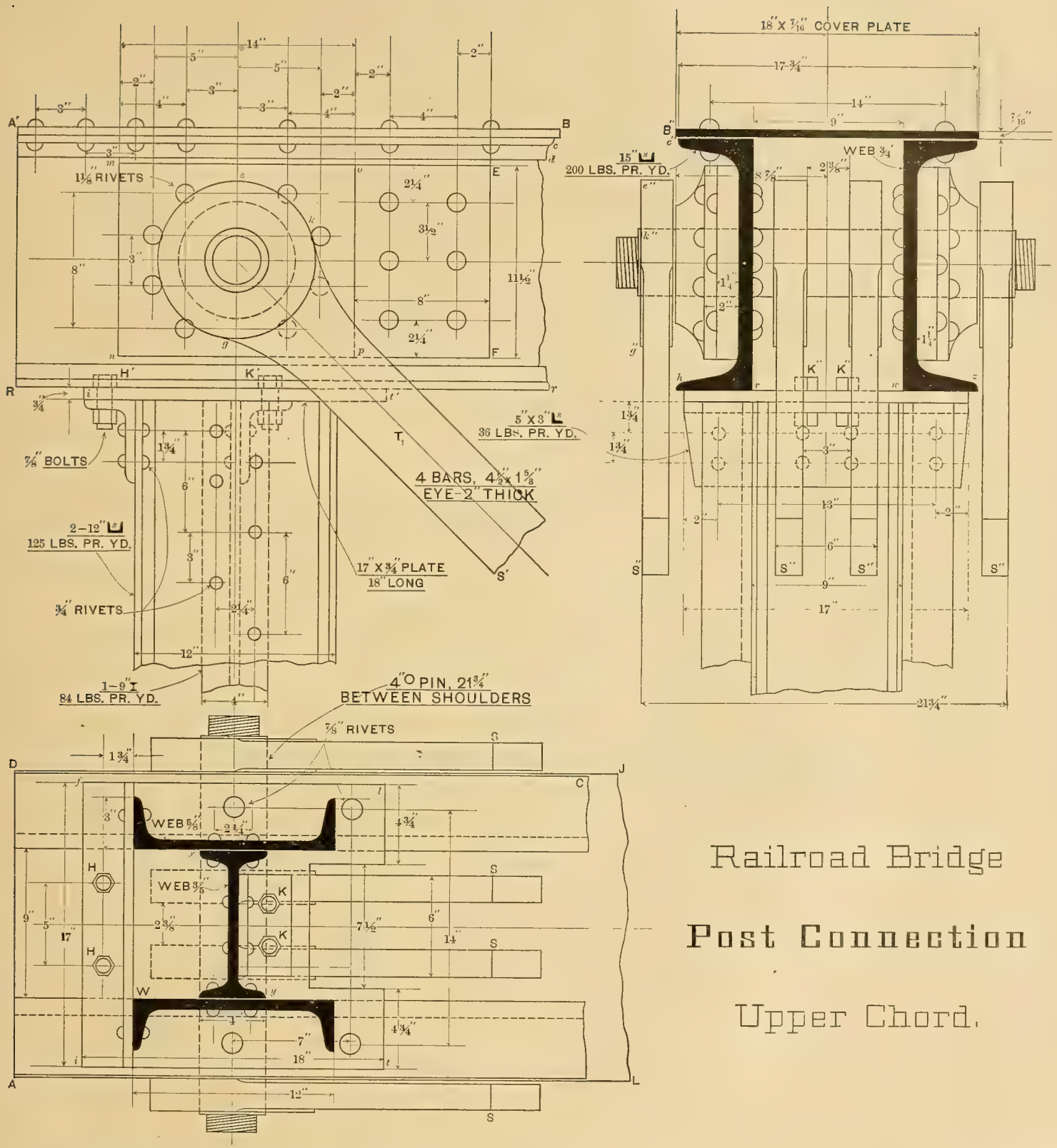










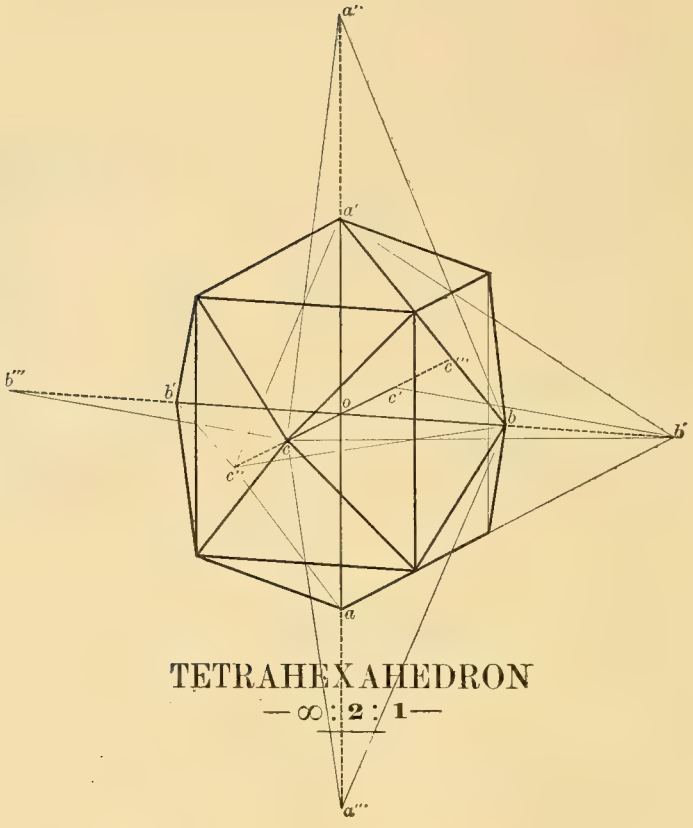


Railroad Bridge

Post Connection

Upper Chord.

(In drawing the above the student will make *horizontal*, not slanting dividing lines in all fractions. Centre and dimension lines in continuous red lines, unless for blue printing, in which case all lines will be black.)



TETRAHEXAHEDRON

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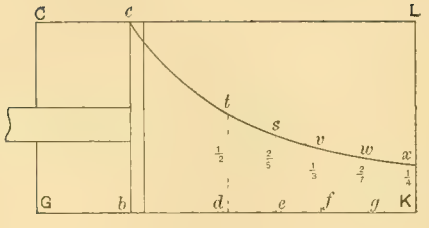

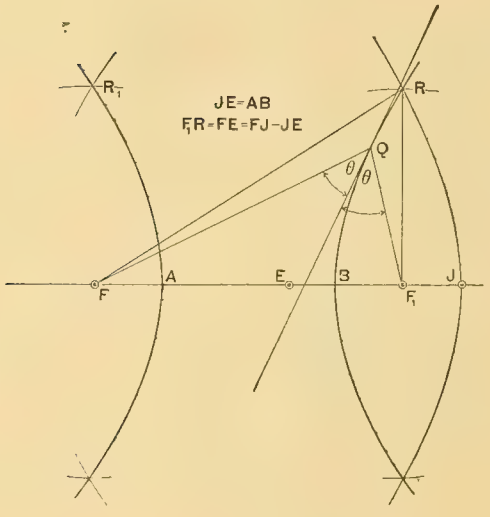

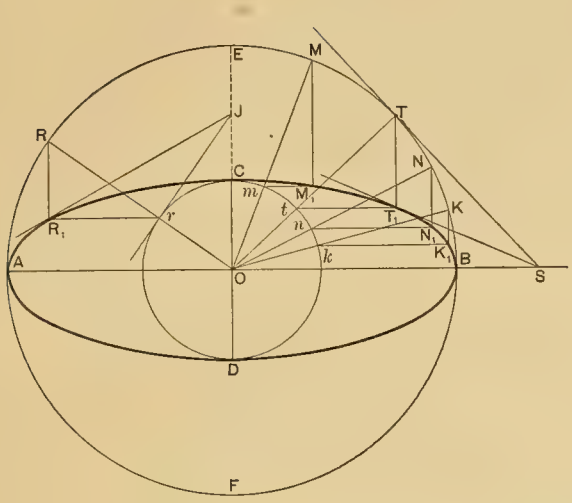
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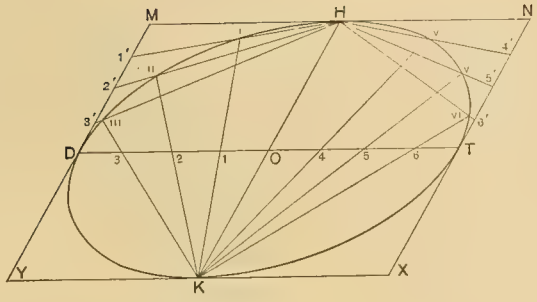
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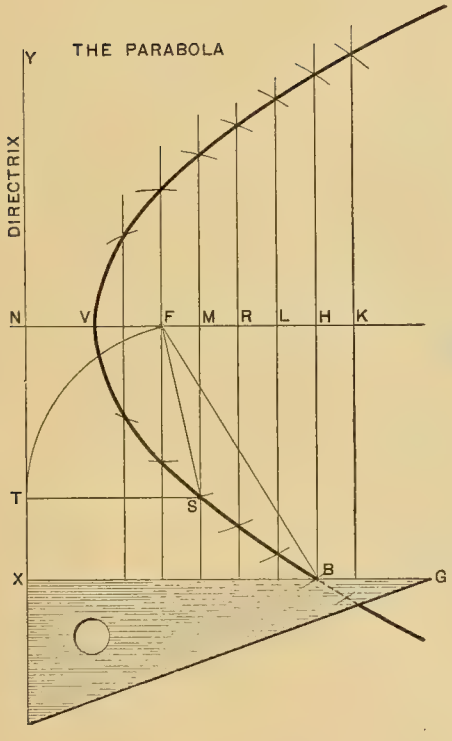
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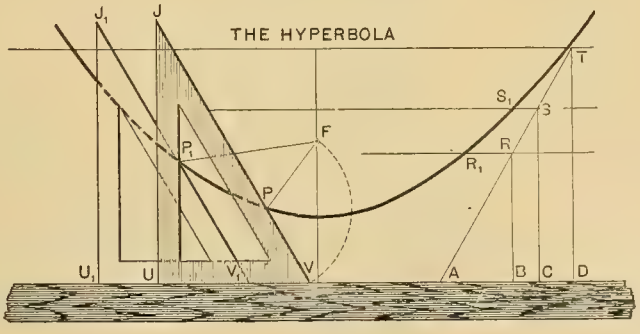
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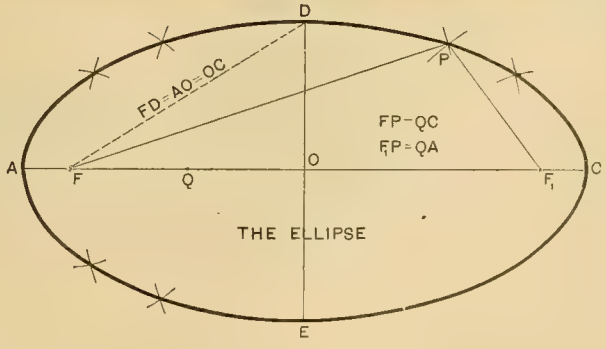
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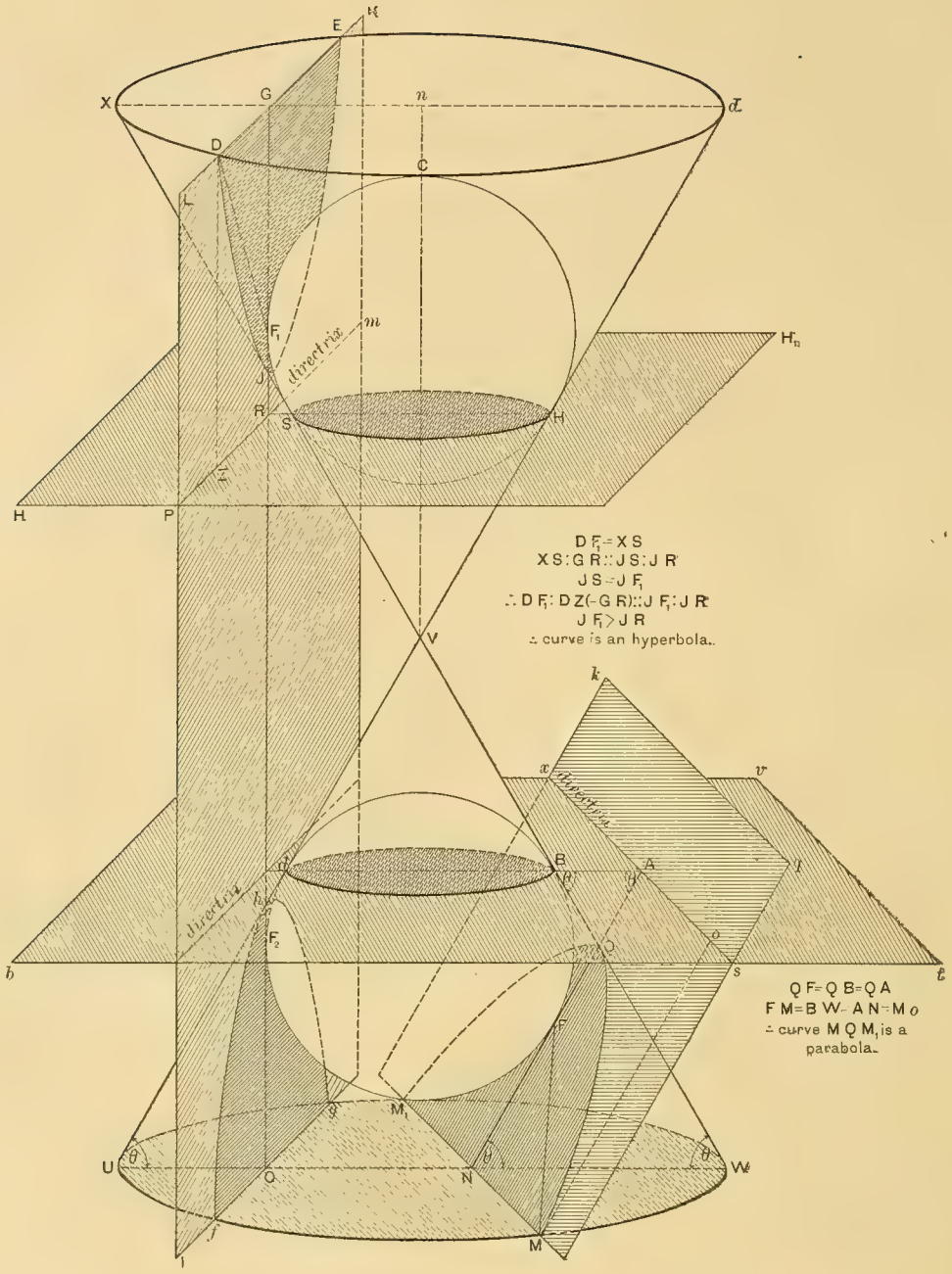
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DF1=XS
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JS=JF1
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JF1>JR
∴ curve is an hyperbola.
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x
directrix
v
B
A
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directrix
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F2
b
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QF=QB=QA
FM=BW=AN=Mo
∴ curve MQM1 is a parabola.
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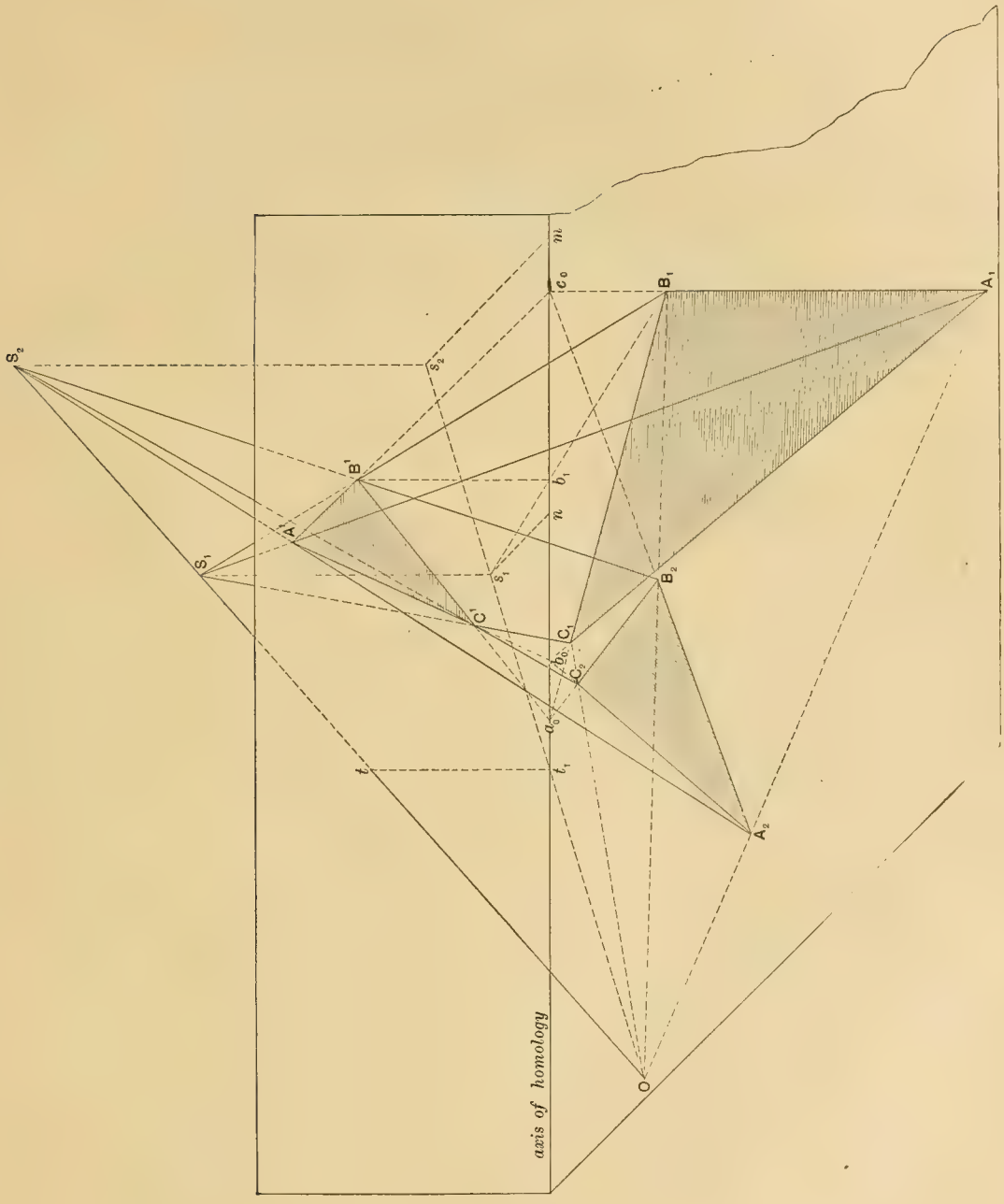
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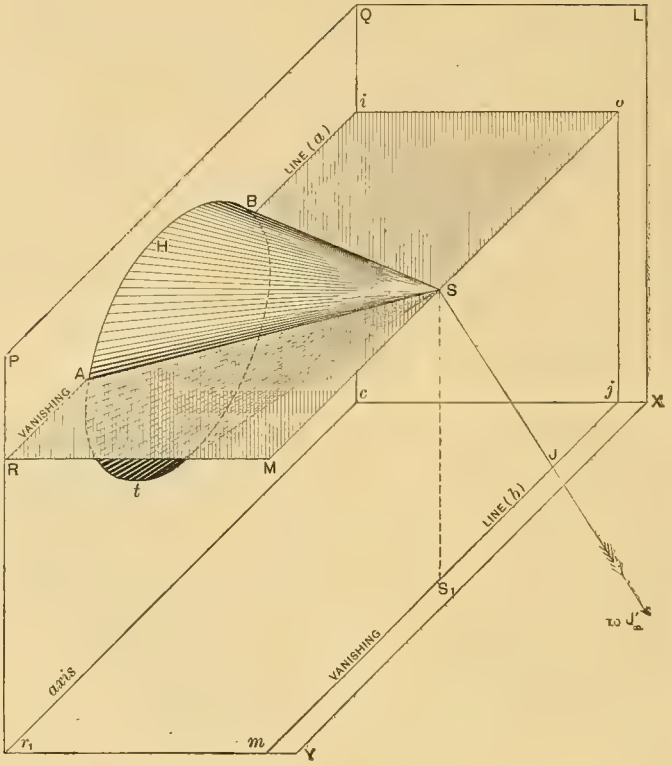
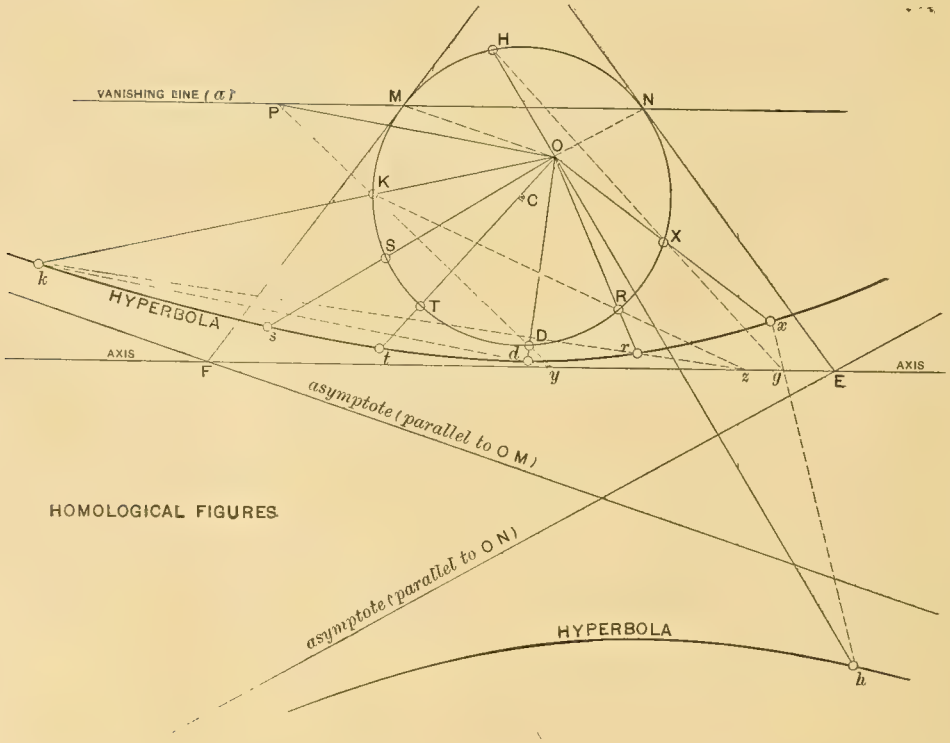
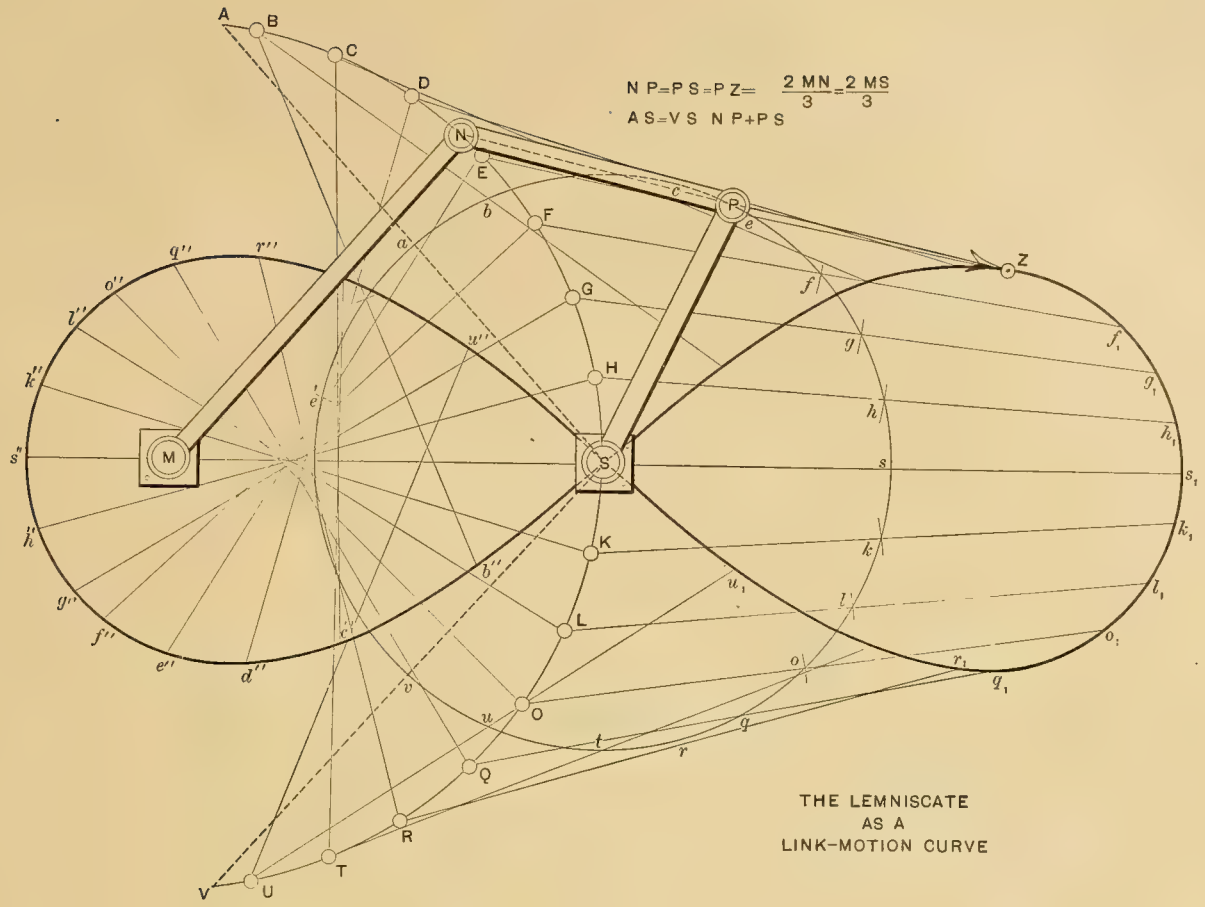
axis of homology





HOMOLOGICAL FIGURES.


NP=PS=PZ= 2 MN/3 = 2 MS/3
AS=VS NP+PS
THE LEMNISCATE
AS A
LINK-MOTION CURVE

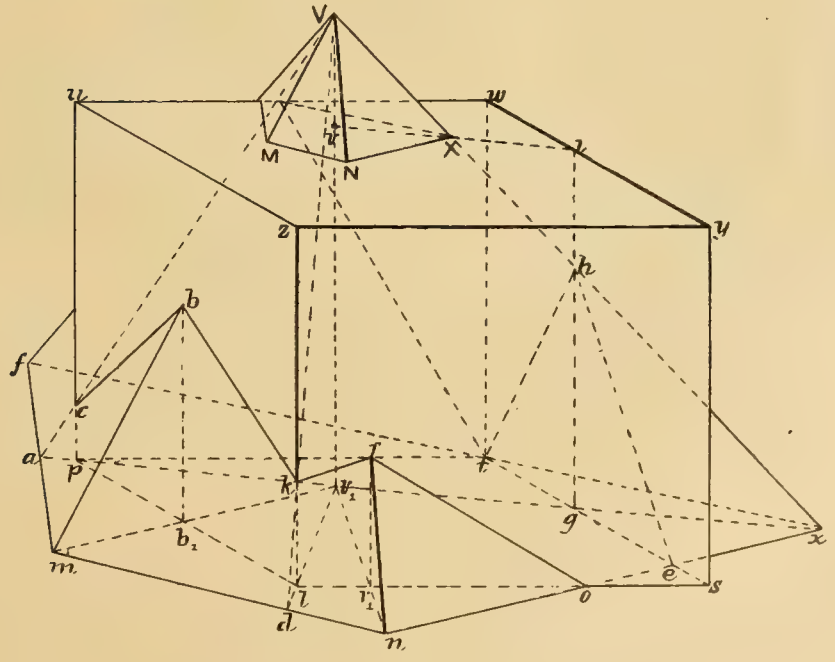
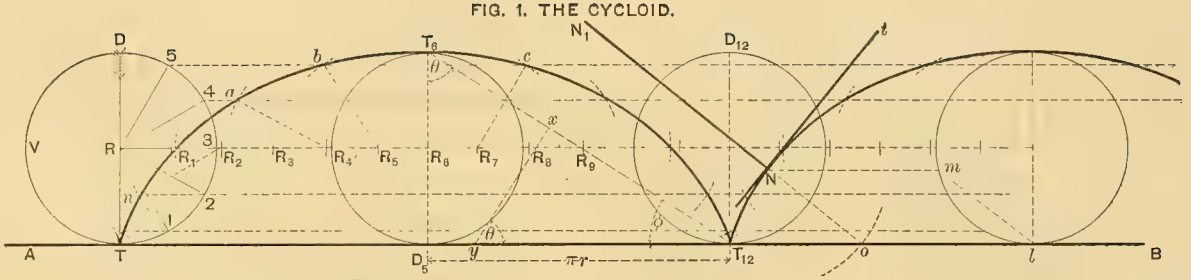


FIG. 1. THE CYCLOID.



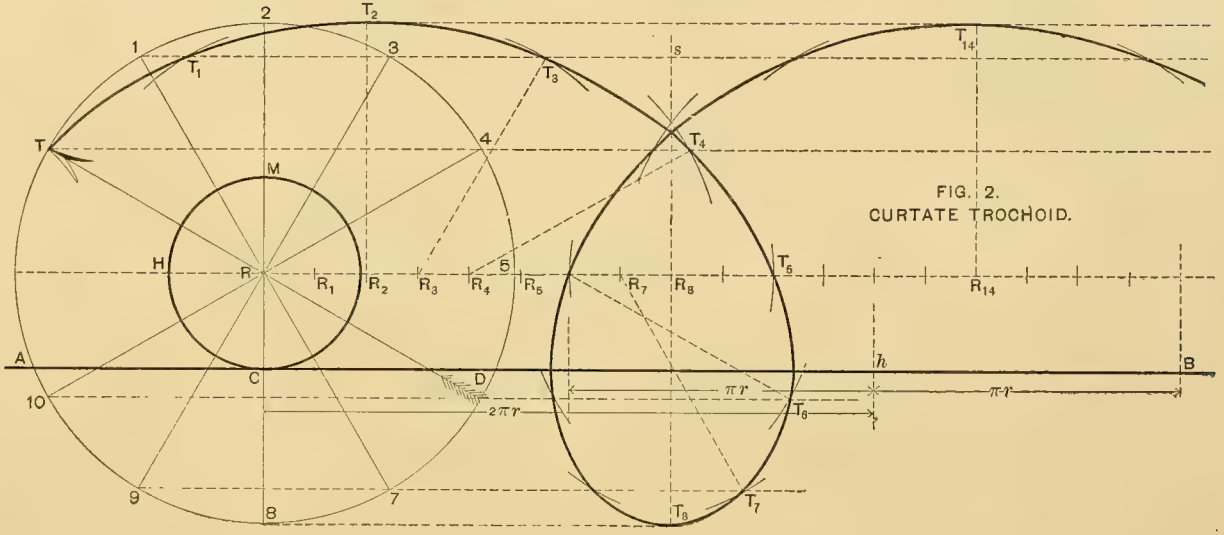
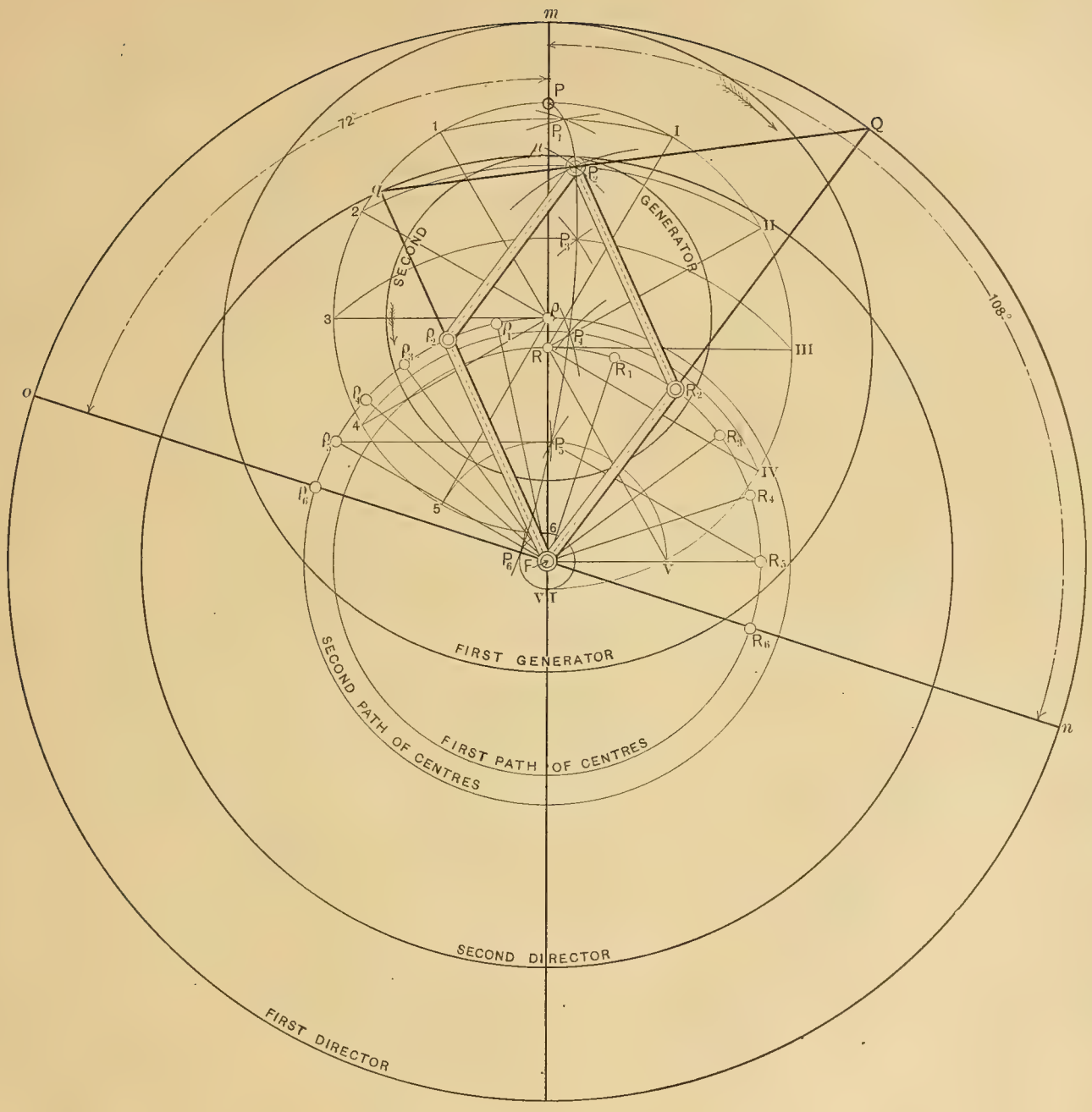


FIG. 2.
CURTATE TROCHOID.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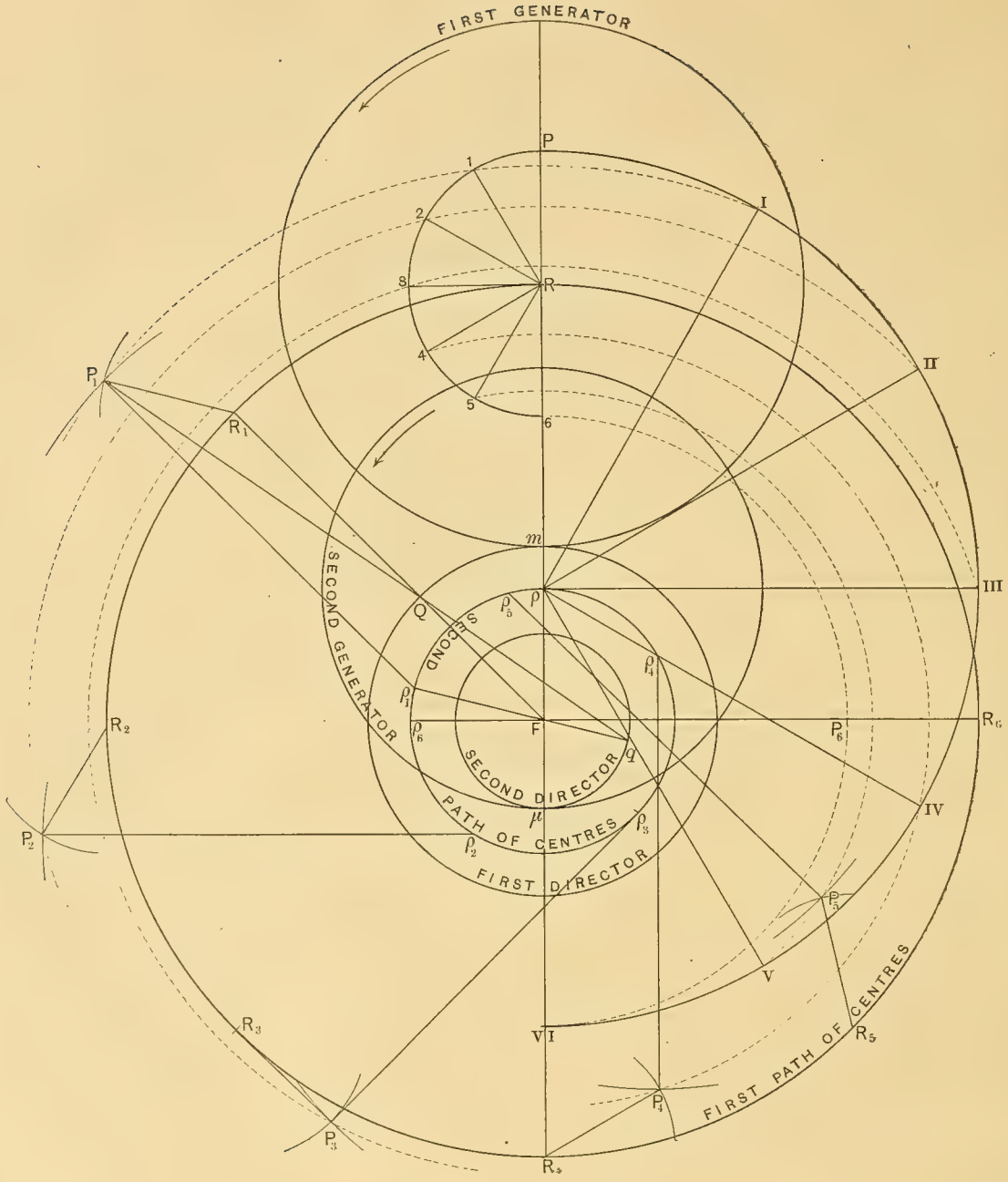
SECOND GENERATOR
GENERATOR
FIRST GENERATOR
SECOND PATH OF CENTRES
FIRST PATH OF CENTRES
SECOND DIRECTOR
FIRST DIRECTOR


FIRST GENERATOR
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4
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R
I
II
III
IV
V
VI
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R1
R2
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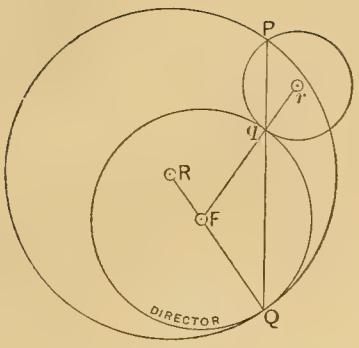
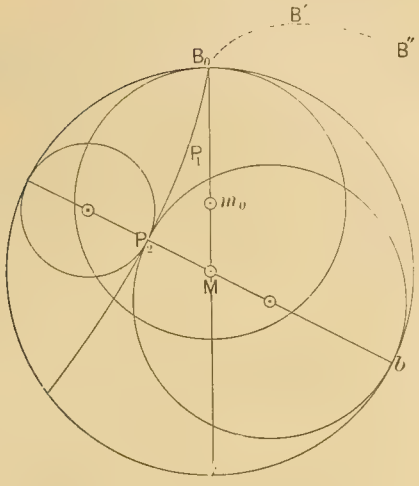
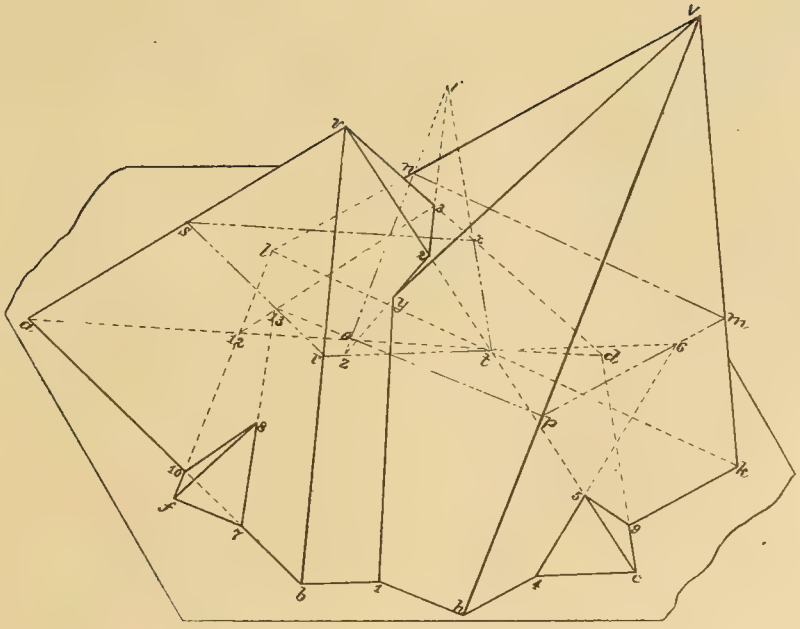
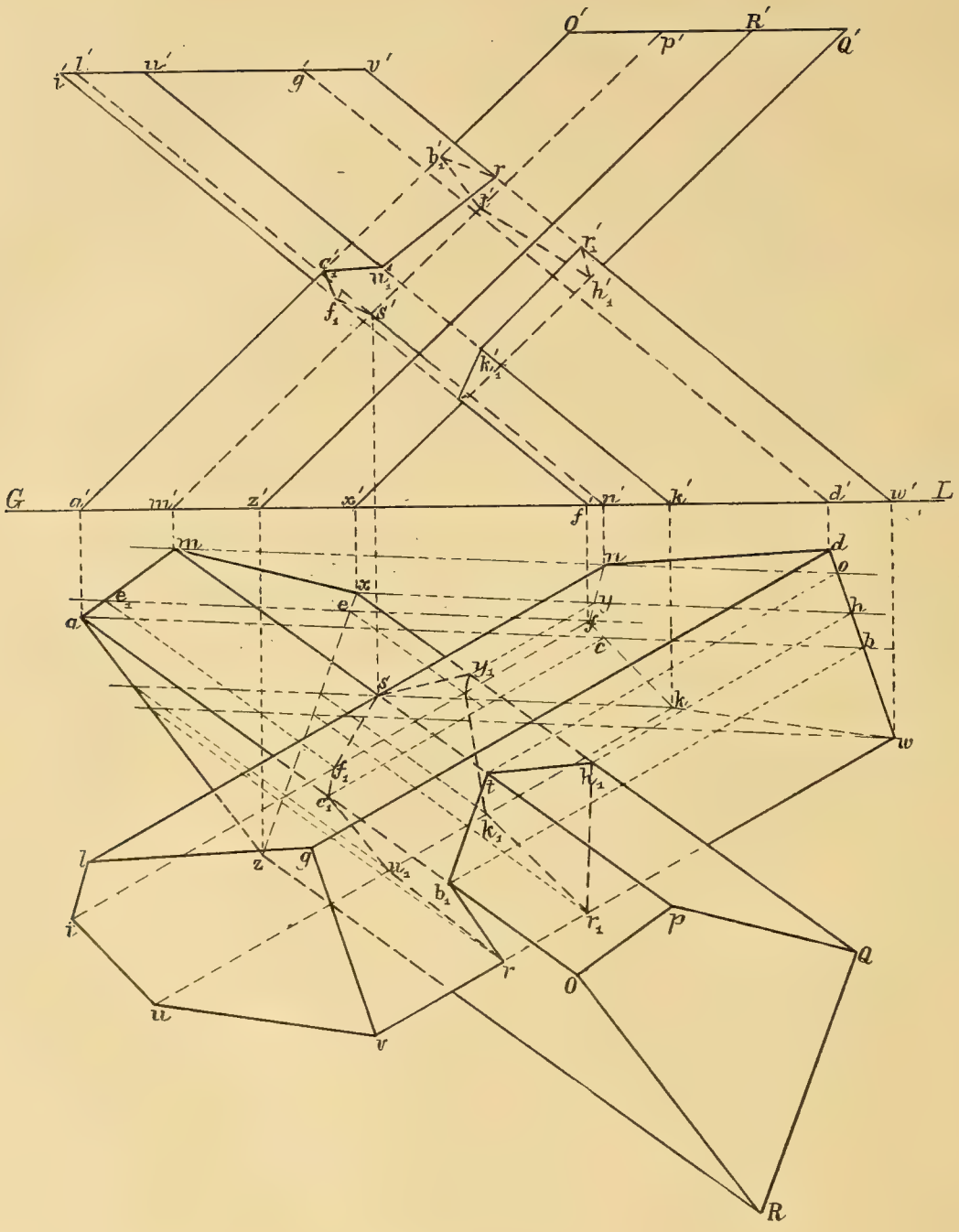
R3
P3
R4
R5
P5
R6
P6
m
Q
ρ
ρ5
ρ1
ρ4
ρ6
F
q
μ
ρ3
ρ2
SECOND GENERATOR
SECOND
SECOND DIRECTOR
PATH OF CENTRES
FIRST DIRECTOR
FIRST PATH OF CENTRES


P
i'
q
R
F
DIRECTOR
Q


B'
B''
B_0
P_1
m_0
P_2
M
b




O′
R′
Q′
P′
G
L

THE remaining plates present a large number of examples that will be serviceable to the draughtman in the designing of titles for maps and other drawings. They are specimens of the type-founder's art, procured for, though not designed with especial reference to, this work.

No. 1.

A B C D E F G H I J K L M N O P Q R S T U V W X Y Z &

a b c d e f g h i j k l m n o p q r s t u v w x y z 1 2 3 4 5 6 7 8 9 0

No. 2.

A B C D E F G H I J K L M N O P Q R S T U V W X Y Z &

1 2 3 4 5 6 7 8 9 0

No. 3

A B C D E F G H I J K L M N O P Q R S T U V W X Y Z &

1 2 3 4 5 6 7 8 9 0

No. 4.

A B B C C D E E F G H I J K L M N O P Q R R S S T U

U V W X Y Z & 1 2 3 4 5 6 7 8 9 0

No. 5.

A B C D E F G H I J K L M N O P Q R

S T U V W X Y Z &

a b c d e f g h i j k l m n o p q r s t u v w

x y z 1 2 3 4 5 6 7 8 9 0

No. 6.

A B C D E F G H I J K L M N O P Q R S T

U V W X Y Z & a b c d e f g h i j k l m n o

p q r s t u v w x y z 1 2 3 4 5 6 7 8 9 0

No. 7.

A B C D E F G H I J K L M N O P Q R S T U

V W X Y Z & a b c d e f g h i j k l m n o p q

r s t u v w x y z 1 2 3 4 5 6 7 8 9 0

No. 8

A B C D E F G H I J K L M N O P Q R S T
U V W X Y Z & a b c d e f g h i j k l m n o
p q r s t u v w x y z 1 2 3 4 5 6 7 8 9 0

No. 9.

A B C D E F G H I J K L M N O P Q R S T U
V W X Y Z & a b c d e f g h i j k l m n o p q r s
t u v w x y z 1 2 3 4 5 6 7 8 9 0

No. 10.

A B C D E F G H I J K L M N O P Q R S
T U V W X Y Z & a b c d e f g h i j k l
m n o p q r s t u v w x y z 1 2 3 4 5 6 7 8 9 0

No. 11.

A B C D E F G H I J K L M N O
P Q R S T U V W X Y Z & a b c
d e f g h i j k l m n o p q r s t u
v w x y z 1 2 3 4 5 6 7 8 9 0

No. 12.

A B C D E F G H I J K L M N O P Q R S T U
V W X Y Z & a b c d e f g h i j k l m n o p q r s
t u v w x y z 1 2 3 4 5 6 7 8 9 0

No. 13.

A B C D E F G H I J K L M N O P Q R S T U V W X Y Z &
∃ 1 2 3 4 5 a b c d e f g h i j k l m n o p q r s t u v w x y z 6 7 8 9 0 ∈

No. 14.

A B C D E F G H I J K L M N O P Q R S T U
V W X Y Z & 1 2 3 4 5 6 7 8 9 0

No 15.

A B C D E F G H I J K L M N O
P Q R S T U V W X Y Z & a b c d
e f g h i k l m n o p q r s t u v w x y z
1 2 3 4 5 6 7 8 9 0

No. 16.

A B C D E F G H I J K L M N O P Q R S
T U V W X Y Z & a b c d e f g h i j k l m n
o p q r s t u v w x y z 1 2 3 4 5 6 7 8 9 0

No. 17.

A B C D E F G H I K L M N O P Q R S
T U V W X Y Z & a b c d e f g h i j k l m n
o p q r s t u v w x y z 1 2 3 4 5 6 7 8 9 0

No. 18.

A A A B B C D D D E E F G H H H I
I J J K L M N N N O O P Q R R S T U
V W X Y Z & 1 2 3 4 5 6 7 8 9 0

No. 19.

A B C D E F G H I J K L M N O P Q R S
T U V W X Y Z & 1 2 3 4 5 6 7 8 9 0

No. 20.

A B C D E F G H I J K L M N O P
Q R S T U V W X Y Z & a b c d e f
g h i j k l m n o p q r s t u v w x y z
1 2 3 4 5 6 7 8 9 0

No. 21.

A B C D E F G H I J K L M N O P
Q R S T U V W X Y Z & a b c d e f
g h i j k l m n o p q r s t u v w x y z
1 2 3 4 5 6 7 8 9 0

No 22.

A B C D E F G H I J K L M N O P Q R
S T U V W X Y Z &
a b c d e f g h i j k l m n o p q r s t u v w
x y z 1 2 3 4 5 6 7 8 9 0

No 23.

A B C D E F G H I J K L M N O P
Q R S T U V W X Y Z &
1 2 3 4 5 6 7 8 9 0

No 24.

A B C D E F G H I J K L M N O P Q R S T U
V W X Y Z & a b c d e f g h i j k l m n o p q r
s t u v w x y z 1 2 3 4 5 6 7 8 9 0

No. 25.

A B C D E F G H I J K L M N O P
Q R S T U V W X Y Z &
1 2 3 4 5 6 7 8 9 0

No. 26.

A B C D E F G H I J K L M
N O P Q S T U V W X Y Z &

No. 27.

A B C D E F G H I J K L M N
O P Q R S T U V W X Y Z &
1 2 3 4 5 6 7 8 9 0

No. 28.

A B C D E F G H I J K L M N O P
Q R S T U V W X Y Z &
1 2 3 4 5 6 7 8 9 0

No. 29.

A B C D E F G H I J K L M N
O P Q R S T U V W X Y Z &
1 2 3 4 5 6 7 8 9 0

No. 30.

A B C D E F G H I J K L M N O P Q
R S T U V W X Y Z &
1 2 3 4 5 6 7 8 9 0

No. 31.

A B C D E F G H I J K L M N O P Q R
S T U V W X Y Z & a b c d e f g h i j k l
m n o p q r s t u v w x y z 1 2 3 4 5 6 7 8 9 0

No. 32.

A B C D E F G H I J K L M N
O P Q R S T U V W X Y Z &
1 2 3 4 5 6 7 8 9 0

No. 33.

A B C D E F G H I J K L M N O P Q R S
T U V W X Y Z a b c d e f g h i j k l
m n o p q r s t u v w x y z &
1 2 3 4 5 6 7 8 9 0

No. 34.

A B C D E F G H I J K
L M N O P Q R S T U V
W X Y Z

No. 35.

A B C D E F G H
I J K L M N O P Q
R S T U V W X
Y Z

No. 36.

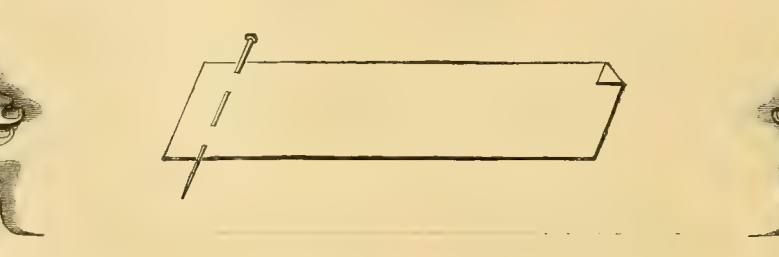
A B C D E F G

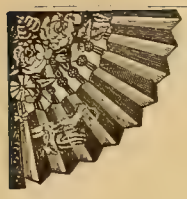
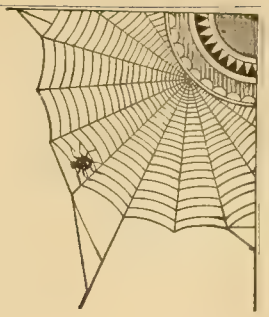
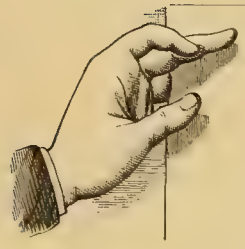
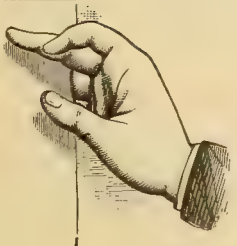
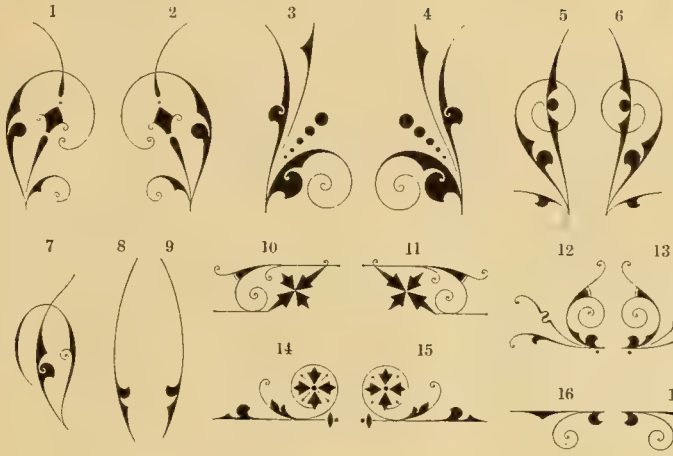
H I J K L M N

O P Q R S T U

V W X Y Z

1 2 3 3 5

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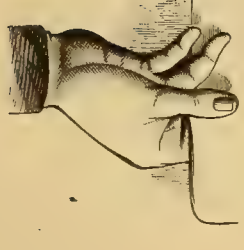
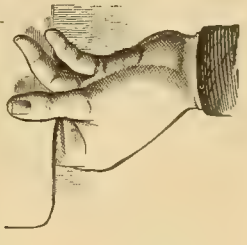

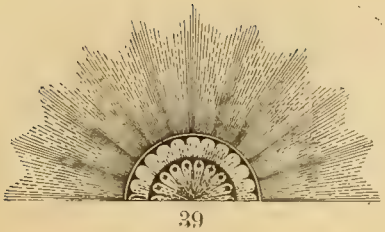

37. A B C D E F G H I J K L M N O P Q R S T
U V W X Y Z & 1 2 3 4 5 6 7 8 9 0 , .

38. A B C D E F G H I J K L M N O P Q R S T U V W X Y Z & , .

39. A B C D E F G H I J K L M N O P Q R S T U V W X Y Z &
1 2 3 4 5 6 7 8 9 0

40. *A B C D E F G H I J K L M N O P Q R S T U V W*
X Y Z & a b c d e f g h i j k l m n o p q r s t u v w x y z . ,
1 2 3 4 5 6 7 8 9 0

41. A B C D E F G H I J K L M N O P Q R S T U V W X Y Z &
a b c d e f g h i j k l m n o p q r s t u v w x y z . , 1 2 3 4 5 6 7 8 9 0

42. A B C D E F G H I J K L M N O P Q R S T U V W X Y Z &
a b c d e f g h i j k l m n o p q r s t u v w x y z . , 1 2 3 4 5 6 7 8 9 0

43. A B C D E F G H I J K L M N O P Q R S T U V W X Y Z &
1 2 3 4 5 6 7 8 9 0 , .

44. *A B C D E F G H I J K L M N O P Q R S T U V W X Y Z &*
a b c d e f g h i j k l m n o p q r s t u v w x y z . , 1 2 3 4 5 6 7 8 9 0

45. A B C D E F G H I J K L M N O P Q R S T U V W X
Y Z & a b c d e f g h i j k l m n o p q r s t u v w
x y z . , 1 2 3 4 5 6 7 8 9 0

46. *A B C D E F G H I J K L M N O P Q R S*
T U V W X Y Z & a b c d e f g h i j k l m n
o p q r s t u v w x y z . , 1 2 3 4 5 6 7 8 9 0

47. A B C D E F G H I J K L M N O P Q R S T U V W X Y Z
& 1 2 3 4 5 6 7 8 9 0 , .

48. ABCDEFGHIJKLMNOPQRSTUVWXYZ&1234567890

49. ABCDEFGHIJKLMNOPQRSTUV
WXYZ&ABCDEFGHIJKLMNOPQRST
UVWXYZ.,1234567890

50. ABCDEFGHIJKLMN
OPQRSTUVWXYZ&
1234567890,.

51. ABCDEFGHIJKLMNOPQRS
TUVWXYZ&.,1234567890

52. ABCDEFGHIJKLMNOPQRSTUVW
XYZ&abcdefghijklmnopqrstuvw
xyz.,1234567890

53. ABCDEFGHIJKLMNOPQRST
UVWXYZ&abcdefghijklmn
opqrstuvwxyz.,1234567890

54. ABCDEFGHIJKLMNOPQRS
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stuvwxyz,.

55. ABCDEFGHIJKLMNOPQR
STUVWXYZ&1234567890,.

56. A B C D E F G H I J K L
M N O P Q R S T U V W
X Y Z & a b c d e f g h i j k l
m n o p q r s t u v w x y z.,
1 2 3 4 5 6 7 8 9 0

57. A B C D E F G H I J K L M N O
P Q R S T U V W X Y Z & 1 2 3
4 5 6 7 8 9 0 ,.

58. A B C D E F G H I J K L M N O P Q R S
T U V W X Y Z & a b c d e f g h i j k l m
n o p q r s t u v w x y z.,1 2 3 4 5 6 7 8 9 0

59. A B C D E F G H I J K L M N O
P Q R S T U V W X Y Z & a b c d
e f g h i j k l m n o p q r s t u v w x y z.,
1 2 3 4 5 6 7 8 9 0

60. A B C D E F G H I J K L M N O P Q R S T U
V W X Y Z & a b c d e f g h i j k l m n o p q r
s t u v w x y z.,1 2 3 4 5 6 7 8 9 0

61 A B C D E F G H I J K
L M N O P Q R S T U
V W X Y Z & 1 2 3 4 5
6 7 8 9 0 , .

62. A B C D E F G H I J K L M N O P Q R S T U V W
X Y Z & a b c d e f g h i j k l m n o p q r s t u v w
x y z . , 1 2 3 4 5 6 7 8 9 0

63. A B C D E F G H I J K L M N O
P Q R S T U V W X Y Z a b c d
e f g h i j k l m n o p q r s t u v w x y z . ,
1 2 3 4 5 6 7 8 9 0

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